



Montana Natural History Center

Fall/Winter 2019

MONTANA Naturalist

TO PROMOTE AND CULTIVATE THE APPRECIATION, UNDERSTANDING AND STEWARDSHIP OF NATURE THROUGH EDUCATION

Rediscovering the North American Beaver

Sugar in the Wild | #OptOutside | Connecting Music and Nature | Wolverine Wanderer

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Cover – Fall meets winter in Glacier's North Fork country. Photo by Laura Verhaeghe, whose photographic style reflects her love of exploration matched with her passion for the outdoors. lauraverhaeghe.com.

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Connecting People with Nature

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tidings

In her insightful feature on sugar in the wild (page 8),

naturalist Alison James notes that wild creatures in general “eat for what they need.” I pondered this earlier this afternoon while eating a piece of birthday cake...and later, when I wasn’t able to resist eating a few bites more. Unlike wild animals, I don’t always eat for what I need. But millions of years of evolution have made it difficult for humans to resist sugary treats—we crave them, our genetic memory recalling a time when those calories were hard to come by, when it was in our best interests to devour any sweet sustenance we came across.

Today, sugary indulgences abound, but our genes haven’t quite caught up. There is a disconnect between what we need—what is good for us—and what is available.

Human lives are full of such disconnects between our biology and the world we have manufactured, for better or worse, in the past few millennia, and centuries, and decades. There’s an irony in the fact that what seems most available to us these days is too much of what we don’t need, and that *too muchness* distracts us from the things we do need: sustenance, connection, purpose, inspiration, reverence.

Perhaps the pieces in this issue can help us begin to overcome these disconnects, reminding us of the diversity and richness in the natural world and inspiring us to seek what we truly need rather than falling back on what is easily available. Nick Littman draws us into the stark beauty of a snowy alpine landscape crossed by wolverine tracks, struck by *Gulo gulo*’s instinct, power, and wildness (page 20). Rob Rich tells the story of beavers in North America, reminding us that these once-commodified landscape engineers are integral to Montana’s wetlands and biodiversity (page 4). While hiking in the Bitterroots, Kelly Dix observes a delicate crab spider devouring a bumblebee before her eyes, a moment that lingers (page 10). John Ashley captures meteors with his camera lens, pulling us into the vivid serenity of an autumn night (page 23). And MNHC staff share some of their favorite outdoor spaces (page 14), places where there are fewer obstacles between us and wildness, where distractions fall away and we, like wild creatures, can move, eat, live for what we need—and no more.

I like to think that all we need is a little nudge here and there to help remind us where we came from. It was not so long ago that we were much more connected to the wild places around us—and in us. Our genetic memory can do more than make us crave sugar, thank goodness. All we need to do is remember.

Allison De Jong

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adejong@MontanaNaturalist.org



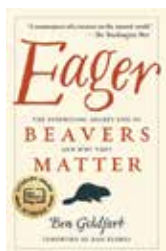
Spending a little time among the wildflowers.

PHOTO BY ALLISON DE JONG

Rediscovering the North American Beaver: The Quest for a Keystone



BY ROB RICH



Want to learn more about beavers?

Be sure to check out Ben Goldfarb's *Eager: The Surprising, Secret Life of Beavers and Why They Matter* before his lecture at the Montana Natural History Center on **October 23**. And young readers of all ages should get their hands on Dorothy Hinshaw Patent's *At Home with the Beaver: A Story of a Keystone Species*.



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In the Lolo National Forest (LNF) just outside Missoula, Sarah Clark sloshes up Miller Creek, feeling for loose cobbles and deep pools with each step. She parts branches of red-osier dogwood as if swimming the breaststroke, taking care not to whip me, sloshing behind her, in the face. “This project has been some of the most intense of bushwhacking I’ve ever done,” Sarah says with a smile, “and I’ve done a lot of bushwhacking.” I grab a taut branch she’s held for me, and we each do a doubletake to ensure it’s not gnawed.

Sarah is volunteering with the National Wildlife Federation (NWF), and she is looking for sign of the North American beaver (*Castor canadensis*)—chews, dams, lodges, food caches, scent mounds, canals, scat—and, of course, the living rodents themselves.

The quest for beaver sign is nothing new; two centuries ago mass commercial trappers were so effective in their reconnaissance that beavers came close to extinction across the entirety of their range. But those early seekers had it easy, because while beavers are certainly elusive and nocturnal, their habits are predictable and their works hard to hide. And, prior to European settlement, beavers were everywhere; between the Arctic tundra and the Mexican deserts and the Atlantic and the Pacific, up to 400 million were estimated to exist.

Thankfully, beavers are recovering, and today their populations hover around 15 million. But, now that people have passed into the seventh human generation since the beavers’ pre-Fur Trade heyday, there is a greater concern than numbers alone suggest: many of us have forgotten how to *see* beavered landscapes, no longer able to read tiered floodplains with swollen stretches of stream, each circled with profuse willows re-sprouting from beaver herbivory. It is certainly normal for beavers to move on to new sites as their choice woody foods and building materials diminish, and this dispersal provides a cyclic succession between stream, wetland, and meadow habitats that is fascinating to discern. Many early settlers knew how these mosaics were made; but many also ditched, drained, or destroyed the beaver-cleared wetlands for their own homesteading, which abruptly halted evolution of the habitat. This complete erasure or ending of beavered landscapes is *not* normal, and over time such anomalies have diminished our knowledge about the distribution and density of beavers, past or present. We might call it a kind of beaver amnesia, a grave forgetting that some of the most precious landscapes where we live, work, and play have been without their creators.

PHOTO BY ANDREA DININO

Species



But climate change is giving us reason to remember. With the prospect of less reliable snowpack, more extreme fire seasons, and warmer, less abundant water, there are new motives to seek and value beavers again. In November 2018, the Fourth National Climate Assessment even gave beavers a nod, and for over three decades, a growing body of peer-reviewed research has proven that beavers are worth far more than a commodified *thing* like a pelt for a hat; they're a *process* that's required to create dynamic, highly functional habitats we can't replicate. In this beavers are like wildfires: both are necessary, restorative agents of change that have renewed Montana's landscapes for millennia, and neither can be suppressed without consequences. So as scientists from varied disciplines ask tough questions about how our watersheds will adapt in the face of uncertainty, they're starting to spell out a shared answer: B-E-A-V-E-R.

In the 1980s, Greg Munther, a retired Fisheries Biologist and District Ranger for the U.S. Forest Service, had a hunch that beavers could indeed answer some of Montana's mounting water concerns. He knew that native tribes like the Blackfeet had long valued the beavers' ability to store water in the arid, fickle

climate where the Rockies met the Plains, and, after lamenting the absent rodents and their relict habitat at his post on the Ninemile Ranger District, he determined he couldn't resolve the problems alone. So Munther experimented with relocating beavers



Sarah Clark (right) takes a mid-stream bushwhacking break with Marcia Brownlee, the Program Manager for the National Wildlife Federation's Artemis Initiative, which aims to engage sportswomen in the protection in the wildlife and public lands.

from private to public land on his District, and he protected them with trapping closures. These were informal trials, but he generally found the beavers to increase the quantity and quality of aquatic habitat. Munther's results were affirmed with new energy in 2016, when the LNF worked with the Clark Fork Coalition (CFC) to complete a Watershed Vulnerability Assessment. As the assessment focused on bull trout (a threatened species under the Endangered Species Act) and water supply, they found that the watershed connectivity and complexity that beavers provide might offer hope against the heat predicted in the decades ahead.

Munther's vision, echoed by the Watershed Vulnerability Assessment, paved the way for the keystone partnership that Sarah Clark was supporting on Miller Creek. This partnership includes core contributions from CFC and NWF, who are working with other organizations and volunteers to advance three distinct but closely linked goals. The first goal is the Watershed Restoration Citizen Science Project, which is designed to assess where, when, and to what extent beavers are occupying western Montana watersheds. Amy Chadwick, a Senior Ecologist and beaver expert with Great West Engineering, kicked off the process with a computerized model suggesting where beavers might be, based primarily on the valley width and stream slope. That helped, because we know beavers prefer slow streams that aren't too steep and have wide floodplains to flood, but there was more to learn on the ground: Where were the hardwood shrubs that beavers would eat? Where were the deep pools that wouldn't freeze to bottom in winter? And fresh sign of live animals? That was needed too,

because we know that beavers—who thrive by going against the flow—rarely follow the rules

* because we know that beavers—who thrive by going against the flow—rarely follow the rules.
* Chadwick's model

thus became a guide for surveys to reveal the presence or absence of real beavers in real time, so that we might see where beavers can best help us heal watersheds at risk from becoming too straight or too hot. Though Sarah Clark and the seven other volunteers in the adult program haven't found any fresh beaver sign on Miller Creek yet,





Readied with tape measures, depth sticks, clinometers, cameras, bear spray, and a whole lot more, this crew of intrepid young citizen scientists ascends Lolo Creek to seek sign of the mighty beaver.



sloshed with waders. As CFC Education Manager Lily Haines and MCC Youth Programs Manager Nick Ehlers have watched their five 2019 teams build confidence with the hands-on field skills in hydrological measurements, backcountry navigation, and wildlife biology techniques required to achieve these results, they have grown increasingly thrilled with the promise of this partnership. There are many insights to glean from the data, but comparisons will be especially valuable with the Fish Creek watershed, which remains one of the few drainages in the state that is closed to beaver trapping, thanks to Greg Munther. When the kids encountered beaver sign at Fish Creek this summer—after all their schlepping and measuring and navigating—they felt like they had rediscovered a great treasure. And they had.

Because LNF doesn't have the time or resources to ground-truth all their models, these citizen scientists are providing nuance that's inspiring the partnership's second goal: to pursue some of the challenging research questions for beaver management, especially those at the intersections of beavers, people, and fish. Montana's

they've documented a moose, a charismatic beaver beneficiary who seemed keen for a wetland on a hot summer day.

I smiled when Sarah said that childhood nature forays were her closest analogue to bushwhacking for beavers, because there is actually a youth component to this citizen science project as well. With leaders from Montana Conservation Corps (MCC), teams of middle schoolers have focused their beaver scouting in reaches of Lolo, Miller, and Fish Creeks in the LNF, as well as the Spotted Dog Wildlife Management Area near Deer Lodge. This youth program sparked the citizen science project in 2018, and when

PHOTO BY FLORIE CONSOLATI

ANATOMY OF A BEAVER

* Beavers have up to 23,000 hairs per square centimeter, making their fur among the densest, warmest, and most waterproof of all mammals. It fueled a felt hat industry, and it literally became currency. When the Hudson Bay Company monopolized the Fur Trade, the medium of exchange was a Made Beaver: the worth of one male beaver pelt harvested in the winter months. In 1795, one Made Beaver could buy you a sword blade. Four Made Beavers could buy a gallon of brandy. And six could buy you some boots.

* The beaver's hind and front feet could not differ more. The dexterous fronts are about the size of a deck of cards, but the hinds are nearly double that size, with wide webbing for flippered propulsion. One of the five toenails on the hind feet is also uniquely split, a handy adaptation to assist beavers' fastidious grooming habits.

* The beaver's flat, scaly tail is built for slapping in alarm, steering in water, stabilizing on land, and providing warmth in winter. The tail swells into a crucial fat storage organ during the cold months, and when coupled with its complex network of blood vessels, only two percent of its heat is lost.

* With closing valves for the ears and nose, fur-lined lips that seal behind the teeth to prevent drowning during underwater stick grasps, and clear nictitating membranes to shield the eyes, beavers have got all their sensory orifices adapted for semi-aquatic success.

* The outside of the beaver's notorious incisors are covered with hard enamel coating (colored orange from iron), but the insides contain soft, pearly dentine. When the enamel shears against the dentine, the incisors are constantly sharpened. But without something to gnaw on, the beaver's incisors would continue growing, and that would create a dental disaster.

* Internally, beavers are metabolic miracles. No other animal can digest fibrous cellulose and tough woody lignin so well. Their knack for coprophagy (eating their poop to squeeze out a second round of nutrients) helps, but so too does the fact that their intestine approaches six times the length of their body.



PHOTO BY STEVE HERSEY



native fish are especially sensitive to water loss and warming in their streams, and some scientists have been concerned that beaver dams could be barriers that seal their fate. But there has been abundant research proving that beaver dams are more porous than we think, and that most steelhead trout and Pacific salmon actually flourish with the variety of overwintering and rearing habitats that beavers provide. There is more to learn in regards to beavers' specific relationship with Montana's grail species—the bull and westslope cutthroat trout—so Ph.D. candidate Andrew Lahr is working with Dr. Lisa Eby, Professor of Aquatic Ecology at the University of Montana, to explore these interactions. Fish and wildlife managers can no longer assume that current conditions will persist in the future, and Lahr will be chasing questions to see how beavers can help ensure that Montana's native fish have enough water to survive into the next century, and beyond.

As Lahr's research evolves, it's worth remembering that beavers and fish as we know them today have been co-evolving too, for the last 7.5 million years they've shared in North America. But as humans have more recently colonized the beavers' haunts, conflicts do happen, and this project's third goal aims to resolve conflicts non-lethally. Because trapping beavers is a temporary, ineffective approach that only makes a void for dispersing beavers to fill, CFC's Restoration Director Will McDowell and Beaver Technician Elissa Chott have spent the summer encouraging landowners to use proven alternatives for success: wire-wrapping to deter gnawing of choice trees, fencing to prevent culvert plugging, and pipe/fence "flow devices" that allow landowners to lower their flooding risk. To a beaver, a road with a culvert is basically just a dam with hole, but these tools use knowledge of beaver ecology to find the compromise. With support from Defenders of Wildlife, CFC eventually aims to build up a cost-share program to incentivize

landowner participation and tolerance that can be adapted across the state.

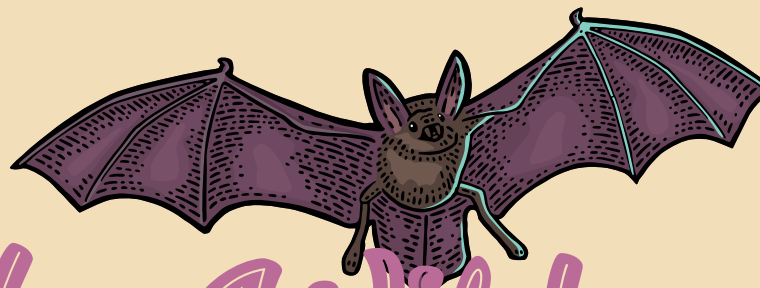
All three of these goals—the citizen science, the research, and the conflict prevention—seem like a lot of work. But they're worth it, because although wetlands cover a mere two percent of the landscape here in the Intermountain West, they hold a whopping 80 percent of its biodiversity. Every drop is priceless, and this multifaceted partnership is proving that what's important is

coming together around this shared resource. Beavers keep wetlands working, and their legacy is not only etched within the topography and hydrology of the continent, but it's also enabling the lives of countless species who thrive where land and water meet and sum their parts. The Common Yellowthroat singing *whichity-whichity-which* in the willows. Plus the Wood Duck with her young, scooting through the sedges. Plus the white-tailed deer drinking from a still pool, and the Columbia spotted frog making a splash. The beaver thrives within—and creates—these convergences, and with leaders like Sarah Bates, Senior Director for NWF's Western Water Initiative, we are getting better at mimicking the masters. Bates has said this partnership is about "laying the groundwork for beavers to return to a receptive landscape," and it's true: this is the foundation we need, working with and for the keystone, putting beavers back on the map. 🦫

One species of prehistoric beaver was as big as a black bear, and another was a burrower the size of a prairie dog. Neither of them built dams, and neither survives today. The modern-day North American beaver fills a different niche, centered on a semi-aquatic lifestyle with chiseled teeth fit to cut wood, and engineering behaviors to impound water. These highly specialized, successful adaptations afford safety from predators and access to food, and in the process of modifying watersheds into a home where they can survive, today's beavers are keystone species who create complex, diverse habitats upon which countless other species depend.



—Rob Rich is a naturalist, writer, educator, and beaver believer. His work has appeared with Earth Island Journal, High Country News, Sierra, Camas, and other publications.



Sugar in the Wild

BY ALISON JAMES

On a hike last year, my companions and I saw a hollow, high up in a tree, with bees hovering all around. We could hear the hum of the hive, tucked into vanilla-scented ponderosa

branches. I think we all pictured a bear cub floating up to get the honey, tied to a red balloon. But the bear cubs in Montana don't need red balloons; deep claw marks in the tree bark showed us exactly how bears reached the beehive.

In nature, honey is actually a relatively rare treat for a bear, and they enjoy eating the bees and the larvae as much as the sweet stuff. Dessert in the natural world just isn't the same as what people enjoy. Cincinnati Zoo Director Thane Maynard points out in his "Eat Like an Animal" podcasts that wild animals generally eat for what they need. Animals have specific nutritional requirements to, say, survive in icy Arctic waters, or hibernate through a long winter,

or feed their young. Some animals, like felines, cannot even taste sugar.

Still, when I think of sugar in the wild, I think first of honey and, by extension, nectar. Bees make honey both to eat and feed their larvae, which they make from the nectar of flowers. The nectar itself is sweet and plants produce it to attract pollinators like bees and other insects, as well as birds and bats. These animals help the plant reproduce by transferring the pollen from the male parts of the plant to the female parts of the plant.

But nectar is more than just sugar water inside a flower. Depending on the plant and the conditions around it, nectar also contains salt, protein, acids, and enzymes, providing both energy and nutrition to the animals that drink it. Plants secrete nectar from nectaries, or glands, which are often located deep inside the flower to encourage pollinators to really get in there, and get covered in pollen in the process. Most flowers only secrete a small amount of nectar at a time, which helps with cross-pollination, because animals have to visit lots of different flowers to get more. Loaded with pollen, the

pollinators fly or crawl from plant to plant to sip and gather nectar, and the pollen gets spread far and wide. When you see a field of beautiful Montana wildflowers, you can be sure that pollinators have been hard at work.

The flowers have been hard at work too, and that might be the most interesting part about sweetness in nature. Plants and pollinators are a perfect example of co-evolution. Like a baker who tests and retests her cookie recipes so she'll have customers lining up to buy them, the plant developed the colorful flower and sweet nectar so pollinators will line up to taste them. The customers at the bakery might spread the word about the delicious cookies, but the pollinators spread pollen to help the plant species thrive. Pollinators might even tell each other about the tastiest places to eat just like people do. Honeybee researchers have discovered that bees communicate by dancing—wagging their bodies in different patterns to tell other bees where the most (and, perhaps, the sweetest) flowers are located. Think of it as the Yelp of the Wild.



Even as plants developed flowers with nectaries to facilitate pollination, some bees, butterflies, and other invertebrates developed long proboscises to better reach the nectar. A proboscis on an invertebrate is a long, tubular, mouth-like structure for sipping or sucking. Many butterflies have a proboscis that rolls up, and if you watch closely, you can see them unfurl it when they land on a flower to feed. Similarly, vertebrates like birds and bats might have a long beak, tongue, or snout to reach a flower's nectar. Whether vertebrate or invertebrate, the pollen gets all over their mouth, face, or body—kind of like when we eat s'mores—and gets spread to all the other flowers they visit.

Some plants developed nectar for reasons other than pollination. Sometimes nectar is for defense from predators and disease. Aspen trees, for example, create nectar in their leaves that attracts predatory insects like ants and wasps. The insects enjoy the nectar but they also fight off other bugs that might eat the tree, and even can help deter herbivory from bigger animals like deer, elk, and livestock. In *Nicotiana*, or tobacco plants, proteins in nectar have been shown to have antimicrobial and antifungal properties. And carnivorous plants produce nectar to attract insects that they eat! The sweet stuff does so much more than just provide a tasty treat for the bees and the birds—it's a tool that plants use in a variety of ways to survive and thrive.

What about other sweet treats in nature? Nectar isn't the only sweet-tasting substance found outside. Maybe you were lucky enough to eat some bright purple, sun-warmed huckleberries right off the bush

this summer (or maybe you had them in a milkshake or pancakes). Fruit, including berries, is another delicious dessert for animals and people that plants make in order to reproduce. If you have ever seen bear poop while hiking on the trail, you might have noticed lots of seeds in there. Fruit is the way a plant gets animals to spread its seeds around. Animals like birds carry the fruit and seeds away, and maybe even cache them, the way squirrels and Clark's Nutcrackers do. Or an animal like a bear or a deer or elk might eat the fruit and poop out the seeds somewhere down the trail, carrying the seeds miles away to grow into a new plant in a new place. That's a pretty smart dessert.

Humans enjoy sugar as much as the next animal, but we're no longer restricted to eating fruit, honey, and other sweet treats only when we come across them in the wild. We have figured out how to distill sugar from plants and combine it with different ingredients to make a nearly endless, magical array of treats. Milk chocolate! Taffy! Ice cream! Gummy bears! Cakes and pies and cookies and ice cream and donuts and soda and jelly beans! But planting jelly beans won't grow a jelly bean tree, and drinking soda certainly won't help protect you from microbes, fungus, or predators. In the wild though, sugar exists for a reason, and has the ability to both help wildlife like bears and bees get the calories they need to get through winter and feed their young, and spread pollen and seeds to help plants

reproduce. Next time you put honey in your tea or order a big slice of huckleberry pie à la mode, savor it, and take a second to appreciate how nature makes dessert. 🐻

—Alison James is a first-generation Montanan who is deeply grateful to her parents for planting her here. She believes that all Montanans, new and old, should work together to care for this extra-special place.



PHOTO BY ALISON JAMES

Huckleberry, Honey, and Goat Cheese Trail Appetizers

1 package rice crackers
1 small package goat cheese
Honey for drizzling
Huckleberries (the fresher the better) or blueberries

Top each rice cracker with goat cheese.
Drizzle honey over the goat cheese, garnish with huckleberries, and enjoy!



Naturalist Notes *from Western Montana and Beyond*

Crab Spider Drama | July 2019

Seen while hiking along Sweathouse Creek (first photo) and the Camas Lake Trail (last three photos).

OBSERVATIONS AND PHOTOS FROM NATURALIST KELLY DIX



But beware...they lie in wait to ambush their prey! On a hike we watched this bee put up a fight,



I've been seeing a lot of goldenrod crab spiders this year. Aren't they beautiful?



but the bee was soon overwhelmed by the tenacious goldenrod crab spider. The spider started to lift the bee up via its silk thread...



...and went to a safe hiding place to eat its prey.



What have you observed outside lately? What wild creatures, flora, and weather exist near your home? What makes your place unique? Tell us about the natural history of your place—and it could get published! Send your Naturalist Notes (up to 350 words) and a photo or drawing, if you wish, to Allison De Jong, Editor, at adejong@MontanaNaturalist.org.

Curl Up and Read!

Enjoy these fall and winter nature books for young kids:

get outside guide



No Two Alike by Keith Baker

Winter Dance by Marion Dane Bauer

You Are Light by Aaron Becker

The Story of Snow:

The Science of Winter's Wonder by Mark Cassino with Jon Nelson

Leaf Man by Lois Ehlert

Autumn is Here! by Heidi Pross Gray

Fall Leaves by Loretta Holland

Red Sled by Lita Judge

The Snowy Day by Ezra Jack Keats

Over and Under the Snow by Kate Messner

Goodbye Summer, Hello Autumn by Kenard Pak

Goodbye Autumn, Hello Winter by Kenard Pak

Fletcher and the Falling Leaves by Julia Rawlinson

Because of an Acorn by Lola M. Schaefer and Adam Schaefer

Snow by Uri Shulevitz

What kids' nature books do you love? Let us know!

Kids' Corner

Helena Koelle and her family had great fun exploring Rattlesnake Creek this summer using the Aquatic Animals Activity from our spring/summer issue.

Have you used the activities and ideas in *Montana Naturalist* to explore your favorite places? Let us know! Send your stories and photos to Allison De Jong, Editor, at adejong@MontanaNaturalist.org.



Calling All Kids!

Do you have any nature art, photography, poetry, or stories you'd like to share? We showcase kids' work in every issue in our "Kids' Corner"—and here's your chance for that work to be yours!

Send submissions to Allison De Jong, Editor, at 120 Hickory Street, Missoula, MT 59801 or by email to adejong@MontanaNaturalist.org.



Save the Date for Summer Camp Registration!

Explore nature with the Montana Natural History Center this summer! Our popular Summer Outdoor Discovery Day Camps offer week-long adventures for kids ages 4 through 5th grade. Campers make friends, explore local natural areas, learn naturalist skills from our highly-skilled staff, and have a ton of fun doing it!

- Registration opens March 12th, 2020
- Scholarship applications open February 1st, 2020
- Scholarship applications due March 1st, 2020
- Discounts for MNHC members
- For detailed camp schedule, visit MontanaNaturalist.org/summer-camps

We hope you'll join us for a great summer of learning and exploration!



get outside calendar



Programs for Kids

Programs free with admission and/or membership.

SEPTEMBER

5, 12, 19, 26

miniNaturalist Pre-K Program, 10:00-11:00 a.m. *Forest Friends*.



14 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Montana Raptors*.

28 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Montana Raptors*.

OCTOBER

3, 10, 17, 24, 31

miniNaturalist Pre-K Program, 10:00-11:00 a.m. *Creepy Crawlies*.

5 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Spooky Skeletons*.



19 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Spooky Skeletons*.

NOVEMBER

7, 14, 21

miniNaturalist Pre-K Program, 10:00-11:00 a.m. *Deer, Moose, and More*.

2 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Horns and Antlers*.

16 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Horns and Antlers*.



DECEMBER

5, 12, 19

miniNaturalist Pre-K Program, 10:00-11:00 a.m. *Coyotes, Wolves, and Foxes*.

14 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Wild Gift Workshop: Drawing from Nature*.

JANUARY

2, 9, 16, 23, 30

miniNaturalist Pre-K Program, 10:00-11:00 a.m. *Animals in Winter*.

11, 25 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Hibernation Celebration!*

20 School's Out Naturalist Program. Visit our website for details!

FEBRUARY

1 Summer Camp Scholarship Application Opens

6, 13, 20, 27 miniNaturalist Pre-K Program, 10:00-11:00 a.m. *Diggin' Dinos and Fossils*.

10 School's Out Naturalist Program. Visit our website for details!

8, 22 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Animals in Winter*.

17 School's Out Naturalist Program. Visit our website for details!

MARCH

1 Summer Camp Scholarship Pre-Approval Deadline

5, 12, 19, 26 miniNaturalist Pre-K Program, 10:00-11:00 a.m. *Wild River Animals*.

12 Summer Camp Registration Opens

14, 28 Saturday Kids' Activity, drop in between 2:00 and 4:00 p.m. *Rockhounding*.



16-20 School's Out Naturalist Programs. Visit our website for details!

PHENOLOGY FOR OCTOBER-MARCH



OCTOBER:

Milkweed seed pods explode open and spread their seeds

Western larch turn gold

NOVEMBER:

Most Ospreys have migrated south

Elk and deer move to winter ranges

Rough-legged Hawks arrive



DECEMBER:

Western painted turtles burrow deep in the mud in the bottom of ponds

Look for river otter "sled" tracks in the snow



JANUARY:

American Dippers continue to feed in open water

Bison shovel snow with their heads to get to grasses



FEBRUARY:

Conifers take advantage of sunny, warm winter days to photosynthesize

Snow fleas crawl across the snow on warmer days



MARCH:

Red-winged Blackbirds return

Marmots come out of hibernation

Vernal equinox



MARMOT: MICK HALL/FICKR.COM; SNOW FLEAS: PVERDONK/FICKR.COM; BISON: CHARLES PETERSON/FICKR.COM; TURKLE: © 2015 ANDREW REDING/FICKR.COM; HAWK: TOM KOERNER/U.S. FISH & WILDLIFE SERVICE; LARCH: DANIEL O'CONNOR/USFS

OCTOBER

5 Naturalist Field Day, 10:00 a.m.-4:00 p.m. *Roadside Geology with Bruce Baty.* \$80; \$70 MNHC members. Registration required.

5 Community Discovery Day, 10:30 a.m.-12:00 p.m. *Family Nature Walk at Lee Metcalf.* Free. Registration required.

12 Community Discovery Day, Annual Banquet and Auction, 5:00-9:00 p.m. University Center Ballroom at the University of Montana. \$50 per person. Ticket required.



16 Evening Program, 7:00 p.m. *Sip and Build: Bone Boxes with Christine Morris.* \$35; \$30 MNHC members. Registration required.

19 Community Program, 2:00 p.m. *Sip and Build: Bone Boxes with Christine Morris.* \$35; \$30 MNHC members. Registration required.

23 Hunting and Gathering Lecture Series: Beavers in North America: Trapped, Valued, and Why They Matter with Ben Goldfarb, 7:00 p.m. \$10; \$5 MNHC members; students FREE.

Oct. 28, Nov. 4, 11, 18 Writing Field Notes Four-Part Class, 4:00-6:00 p.m. \$65; \$60 MNHC members. Registration required.

30 Evening Program, 7:00 p.m. *Naturalist Trivia Night! hosted by the National Wildlife Federation.* \$5 suggested donation; MNHC members free.

NOVEMBER

6 Evening Program, 7:00 p.m. *Sip and Sketch: Gratitude Art Journaling with Kate Crouch.* \$35; \$30 MNHC members. Registration required.

12 Evening Program, 6:00 p.m. *Sip and Sketch: Family Tree Ring Timeline with Lisa Bickell and Bailey Zook.* This is a wonderful class to take with a child! Individual: \$30; \$25 MNHC members. Pair: \$45; \$40 MNHC members. Registration required.

13 Evening Program, 7:00 p.m. *Naturalist Trivia Night! Montana State Parks.* \$5 suggested donation; MNHC members free.

20 Hunting and Gathering Lecture Series: Brain Tan Buckskin with Joshua Lisbon, 7:00 p.m. \$10; \$5 MNHC members; students FREE.

30 Holiday Wreath Class, 2:00-4:00 p.m. \$40; \$35 MNHC members. Registration required.



DECEMBER

6 Open House & Holiday Pop-Up Shop, 4:30-6:30 p.m. *Claudia Paillao of Patagonian Hands* will be selling felted birds, Christmas tree ornaments, silver earrings, and other gifts!

11 Evening Program, 7:00 p.m. *Sip and Felt: Yellow Warblers with Claudia Paillao.* \$40; \$35 MNHC members. Registration required.

12 Evening Program, 7:00 p.m. *Sip and Felt: Yellow Warblers with Claudia Paillao.* \$40; \$35 MNHC members. Registration required.

JANUARY

1 Summer Master Naturalist Class Registration Opens

7, 14, 21, 28 Seasonal Round Four-Part Class, 4:00-6:00 p.m. \$65; \$60 MNHC members. Registration required.



FEBRUARY

February 4-May 5 Spring Montana Master Naturalist Course, Tuesdays, 4:00-7:00 p.m., plus three full-day Saturday field trips (dates TBD). \$425; \$395 MNHC members. Registration required.



Volunteer Opportunities

MNHC will be offering **BEETLES** (Better Environmental Education, Teaching, Learning & Expertise Sharing) professional learning sessions this school year for staff, volunteers, environmental education professionals, and anyone else interested in environmental education. FREE. Please join us for any or all! For more information or to RSVP, contact Stephanie Potts at spotts@MontanaNaturalist.org.

SEPTEMBER 23 Field Journaling with Students, 2:00-5:00 p.m.

NOVEMBER 18 Making Observations, 9:00 a.m.-12:00 p.m.

DECEMBER 16 Evidence and Explanations, 9:00 a.m.-12:00 p.m.

JANUARY 27 Promoting Discussion, 9:00 a.m.-12:00 p.m.

FEBRUARY 24 Constructing Understanding, 9:00 a.m.-12:00 p.m.

MARCH 23 Nature and Practices of Science, 9:00 a.m.-12:00 p.m.

APRIL 20 Questioning Strategies, 9:00 a.m.-12:00 p.m.



**GOOD
FOOD
STORE**

The Montana Natural History Center
thanks the

GOOD FOOD STORE

for sponsoring our 2019 lecture series -

HUNTING AND GATHERING:

LEARNING TO READ THE LANDSCAPE

MNHC Hours:
Monday-Friday, 9 a.m. - 5 p.m. | Saturday, noon - 4 p.m.

Admission Fees:
\$3/adults (18+), \$1/children (4-18), \$7/family rate
Free/children under 4

FREE admission for MNHC members, ASTC Travel Passport Members, and EBT card holders!

Programs and events held at MNHC, 120 Hickory Street, unless otherwise noted.

Visit MontanaNaturalist.org to register for programs and become a member. For more information, call MNHC at 327.0405.

Programs subject to change. Please check our website calendar for the most up-to-date information.

get outside guide

#OptOutside!

Here are a few of the MNHC staff's favorite places for outdoor adventures, from solo explorations to fun with the whole family.

Share pictures of your adventures, and let us know of your favorite places to explore! Tag #MNHC or #mtnaturalhistorycenter.



Waterworks/North Hills

WATERWORKS/ NORTH HILLS

One of my favorite trails is Waterworks or the North Hills, with two easily-accessible trailheads at Orange Street and Greenough Drive. This trail system offers stunning views of the Missoula landscape and gives you a great sense of how vast our green spaces are.

~Bailey Zook,
Teaching Naturalist

BIKING THE BITTERROOT TRAIL

Bike riding is a great way to get the whole family outdoors! There are many great bike routes around Missoula (ci.missoula.mt.us/1990/biking-in-missoula), and those looking for a bit more distance and adventure can enjoy riding to Lolo (or beyond!) on the Bitterroot Trail (bitterroottrail.com),

which offers stunning views of the Bitterroot Mountains and stretches all the way to Hamilton. ~Stephanie Laporte Potts, Youth Programs Coordinator

CRAZY CANYON

The Crazy Canyon trailhead is just a six-minute drive from Higgins Avenue up Pattee Canyon Road. Depending on snow cover you may want yak-tracks, snowshoes, or cross-country skis. The trail—mostly a gated Forest Service road—winds about three miles uphill to the top of Mt. Sentinel. Look for lichen on branches and trunks along the way, as well as birds including Steller's Jays, Clark's Nutcrackers, nuthatches, chickadees, and woodpeckers! ~Christine Morris, Community Programs Coordinator

CAMAS LAKE

If you're looking to get out of town without spending all your time in the car, Camas Lake is a great destination. The trailhead is located off Lost Horse Road just south of Hamilton, and from there it's a 5.5-mile round trip hike to the lake. Camas Lake is gorgeous any time of year, whether you're looking for spring flowers, a summer picnic, fall colors, or a winter snowshoe adventure. ~Drew Lefebvre, Museum Programs Coordinator & Volunteer Coordinator

GREENOUGH PARK

Greenough Park is nestled in the lower Rattlesnake Valley an easy half-mile walk from downtown Missoula. The 42-acre park has plenty of natural areas, including beautiful and bubbling Rattlesnake Creek. In the late fall, the wooded trails that wind along the creek are perfect places to spot woodpeckers, owls, and

nuthatches—and often an American Dipper working the creek, looking for a tasty caddisfly nymph. ~Thurston Elfstrom, Executive Director

BLODGETT OVERLOOK

The Blodgett Overlook trail west of Hamilton in the Bitterroots is great for the whole family! The 1.5-mile trail ascends gradually, switchbacking through open ponderosa pine forest with lovely views out over the Bitterroot Valley. Whether sunny

or rainy or snowy, the view is always stunning, with steep cliffs to the north and a long look west up the canyon into the Selway-Bitterroot Wilderness.

~Allison De Jong,
Communications
Coordinator



Blodgett Overlook



Greenough Park

MACLAY FLAT

Nestled along the Bitterroot River, the Maclay Flat nature trail is easily accessible for a wide range of visitors. Whether you travel the full 1.75-mile loop or just selected parts, great options exist year-round for people of all ages: birdwatchers, runners, walkers, families with children and strollers, photographers, artists. Depending on the season, visitors can find Bald Eagles, Great Horned Owls, Pileated Woodpeckers, crossbills, and redpolls, as well as deer, beaver, and moose.

~Christine Wren,
Teaching Naturalist

CHRISTMAS TREE HUNTING!

Visit your local Forest Service office for a tree

permit (just \$5 per tree!) and information on where to go. Pack up some warm clothes and snacks and head out for an adventure. Will you choose a Douglas-fir, or maybe an Engelmann spruce? Or perhaps you'll find the perfect grand fir or subalpine fir to grace your living room this season. Begin a great family tradition! ~Lisa Bickell, Education Director



Connecting Music and Nature:

The Missoula Symphony Brings *Sleepover at the Museum* to Life

BY ALLISON DE JONG

It's not every day that natural history explorations are combined with a musical score, but the two will come together this February in the Missoula Symphony's performance of *Sleepover at the Museum*, a multimedia orchestral work by author and composer Karen LeFrak based on her acclaimed children's book. In the story, Mason and his two friends get to spend his birthday night at the American Museum of Natural History, where they embark upon a scavenger hunt, solving clues and scouting for the best place to sleep. Will they curl up beneath the *Tyrannosaurus rex* in the Hall of Dinosaurs? Amongst the vivid colors of butterfly wings in the Butterfly Pavilion? Surrounded by planets in the Earth and Space Room? No matter where they choose, this is definitely the best birthday ever!

This nighttime natural history adventure will be brought to life for all Missoula-area fourth graders this winter. The Missoula Symphony has a wonderful tradition of performing lively youth and family concerts. "We introduce [the fourth graders] to the different instruments in the orchestra, so they can experience what they sound like," says Jo May Salonen, Executive Director of the Missoula Symphony Association. "We like to have fun with this concert, start to lay a small foundation about music a few months before they decide what they will play in band or orchestra in fifth grade."

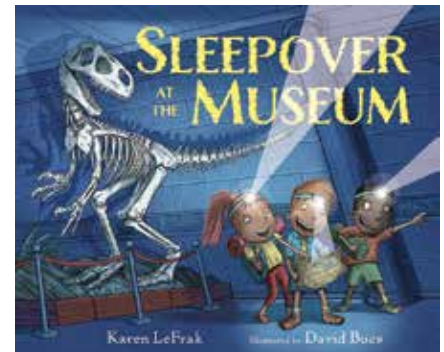
Sleepover at the Museum is a perfect fit for the Missoula Symphony's annual youth concert, and the Missoula Symphony is taking the original score even further. It's been performed only twice before, premiering in Miami last February and performed again in Napa Valley last July. The Missoula Symphony is taking the program's third performance far beyond the narration and slideshow of the previous concerts, partnering with Missoula organizations and personalities to craft an exciting hour-long stage production. The Montana Natural History Center is excited to be one of the collaborators, providing a nature education component that complements the musical performance.

This "Notes of Nature" segment will use various instruments

to represent the sounds of different animals, reflecting both animals in the book and Montana's wild creatures while also providing an entertaining musical experience. MNHC naturalists will round out the natural history portion by providing fun nature interpretation, bringing our local flora and fauna to life.

The program is sponsored by the Washington Foundation and Blackfoot, and will be performed at the Dennison Theatre three times on Friday, February 7th: twice during the day for 2,000-plus fourth

graders from as far away as Drummond and Seeley Lake, and again in the evening, for the community, with all three performances conducted by guest conductor Luis Millan from the University of Montana. In addition to collaborating with MNHC,



MNHC's "Notes of Nature" segment will use various instruments to represent the sounds of different animals.

the Missoula Symphony has lined up talented narrators from

the community, with Mark Moss from Tell Me Something narrating the daytime performances and Mayor John Engen narrating the evening performance.

"We're very excited to produce this ourselves," says Jo May. "We're taking a fantastic show and giving it a Missoula community feel. It's going to be a great event."

Tickets for the evening Family Concert usually sell out, so purchase yours soon! \$8/person. Purchase online at missoulasympphony.org, by phone at 406.721.3194, or in person at 320 East Main Street.

imprints

Exhibits Update

This September we welcomed the work of naturalist and artist **Jenah Mead** in our **Naturalist Field Station**. In this hands-on exhibit, Jenah explores the extraordinary biodiversity in our local urban parks including Bancroft Pond, the Kim Williams Trail, and Greenough Park through observation and nature journaling. Visitors can flip through Jenah's journals, practice her methods, and make their own journal entries.

Come check out the upgrades to our popular **Glacial Lake Missoula exhibit!** With funding from the Montana State Tourism Grant Program and the Glacial Lake Missoula Chapter of the Ice Age Floods Institute, the newly-designed exhibit more fully explores the entire scope of the Ice Age Floods from the Missoula Valley to the Pacific Ocean, with particular focus on Glacial Lake Missoula, evidence in and around the Missoula Valley, and Joseph Pardee, the geologist who read the landscape and discovered the fascinating story of the great floods. In addition, we partnered with Inspired Classroom and the GLM Chapter of the Ice Age Floods Institute to create a series of short videos about Glacial Lake Missoula, from an overview of the floods to detailed information about the strandlines, Camas Prairie ripple marks, glacial erratics, and more.

Our **Nature Adventure Garden** also got an upgrade this summer, making it accessible to children and adults with disabilities. The garden is a 2.5-acre play space open to the public and specifically designed for creative, outdoor play. Right next to the river trail, it's a perfect spot for families to take a break, relax in the shade, and play in nature. Thanks to a generous grant from the Missoula Kiwanis Club, we've added a wide, accessible trail made of crushed granite that wanders through the garden; a sensory garden featuring native plants that engage the senses of smell and touch; and, later this fall, a welcoming entrance arch just off the river trail encouraging families to step inside, play, and explore. Stop by and enjoy it!



Naturalist Field Station



Glacial Lake Missoula exhibit



Nature Adventure Garden

SAVE THE DATE FOR OUR
**ANNUAL
BANQUET
AND
AUCTION**

**10.12
2019**



SATURDAY, OCTOBER 12TH

5:00-9:00 p.m.

University Center Ballroom

Join us for a delightful evening of celebration and support! Bid on nature excursions, exciting travel packages, local dinners, original artwork, and more in our live and silent auctions. Catch up with friends and fellow nature lovers and help us celebrate 28 years of connecting people with nature! Reserve your seat online at MontanaNaturalist.org or call 406.327.0405.

\$60 per person after September 19th.

We were thrilled to welcome three new staff to our ranks this summer! Glenna Tawney joined us in June as our Marketing and Events Coordinator, and our two new Teaching Naturalists, Ser Anderson and Jenah Mead, joined us at the end of August.

➤ **Glenna** grew up in Coeur d'Alene, Idaho, where she spent summers exploring the lakes and mountains around her home. She traded lakes for rivers when she moved to Missoula to attend the University of Montana. She holds a bachelor's of science in business management and a master's of education from UM, where she also played for the Griz soccer team. She was first introduced to MNHC while teaching 4th and 5th grade at Lolo School. She was so impressed with the Visiting Naturalist in the Schools Program, she later joined the MNHC Board of Directors and volunteered on VNS field trips. After leaving the classroom, Glenna spent six years at Biomimicry 3.8, a consulting and professional training company focused on sustainable design based on nature. Glenna coordinated workshops for Biomimicry 3.8 in Costa Rica, South Africa, Australia, and various locations in the U.S. You can find her camping, hiking, and floating Montana's rivers with her husband Land and two children.



Glenna Tawney

➤ **Ser** grew up exploring the natural areas in and around Missoula—from Bancroft Pond and Lewis & Clark Elementary School's Outdoor Classroom to Mt. Sentinel, Pattee Canyon, and the Rattlesnake—and spending time at their family's cabin on Flathead Lake. Always fond of native plants and birds, they honed their naturalist skills while earning a B.A. in Environmental Studies at the University of Montana. They have continued to develop and share their naturalist skills in a variety of seasonal positions with MNHC, Montana Conservation Corps, Flathead Lake State Park, and Ecology Project International's Yellowstone Program. They are passionate about citizen science and have participated in monitoring projects with Montana Audubon, Glacier National Park, and Wolverine Watchers. They enjoy bird watching, identifying plants, ultimate frisbee, writing, reading, hiking, cross-country skiing, photography, swimming and rowing at Flathead Lake, berry picking, and cooking.



Ser Anderson

➤ **Jenah** is an educator with over a decade of teaching experience. After finding her calling while guiding tours at a wildlife sanctuary, Jenah moved to Missoula to study at the University of Montana. Jenah has a B.S. in Wildlife Biology and is currently pursuing an M.S. in Environmental Studies, focusing on Environmental Education. Jenah has been involved with MNHC since 2014 when she joined us as a volunteer and later as an intern. When she's not teaching, Jenah is often found making art or chasing her son, Sam, through creeks and trails with her husband, Billy. She is also passionate about volunteering, birding, and losing herself in a great book.



Jenah Mead

Glenna takes the place of Sarah Millar, who, with her husband Zach, is keeping busy with The Dram Shop and the new Dram Shop Central! We also bade a fond farewell to Jenéle Dowling, our Staff Scientist and Wings Over Water Coordinator, who accepted a position as Scientific Director with Adventure Scientists in Bozeman this past summer. We wish them both well in their new endeavors!

We are also very happy to have our very own Drew Lefebvre move into the (new) position of Museum Programs Coordinator, which includes managing our Wings Over Water Program. Congrats, Drew!

2020 Lecture Series: Capturing Nature

Stay tuned for our 2020 lecture series! We're exploring a new angle this year, and we're excited to share it with you. While our lectures these past two years have focused on what we can physically gather and find in the natural world—from fungi to fossils to medicinal herbs—our 2020 series will explore how humans as observers and scientists can capture nature with a light impact: through writing, photography, storytelling, and research. Speakers and dates will be revealed soon!



PHOTO BY ALLISON DE JONG

Young Women in Science: Full STEEM Ahead!

This summer staff naturalists Kelli Van Noppen and Bailey Zook led an exciting new program for middle school girls. STEEM (Science, Technology, Engineering, Environment, and Math) is a multi-year program supporting young women through their 6th-8th grade years. Beginning this past summer, five upcoming 6th-grade girls attended a week-long summer institute at the Montana Natural History Center, complete with field experiences, special guests, and a self-directed capstone project. They focused on the physics of flight and visited Neptune Aviation and UM's Ornithology Flight Lab to learn about airplanes and birds respectively. The young women also got to lead groups of kids in paper glider making, testing, and redesigning at spectrUM to share the knowledge they gained during the week.

Bailey and Kelli will stay in touch with the girls throughout the school year, meeting a few times to chat about middle school, classes, projects, and the future of STEEM. The young women will then return the next two summers as upcoming 7th and 8th graders to help welcome each new group of rising 6th graders and serve as their mentors while gaining more professional and life experience. *Stay tuned!*

Right: The STEEM Sisters teach the physics of flight to kids at spectrUM.

Below:
The STEEM Sisters (l-r): Instructor Kelli, Ella, Dylan, Zoe, Eliza, Instructor Bailey, and Caroline



MNH C PHOTOS



NPS PHOTO

A wolf chases away magpies and ravens from a carcass in Yellowstone.

As To The Mission

Lately I've been reflecting on the nature of collaboration. Pun intended—I mean, we are a nature center, after all.

As a nonprofit organization, we rely on various partnerships and collaborations to carry out our mission of connecting people to nature.

Perhaps the most visible collaboration is that with our wonderful supporters. From the participants of our programs and our vital community supporters to the generous corporate donors and amazing foundations, there is a mutual exchange that helps this cohort cooperatively carry out stewardship ideals and projects with the ultimate goal of preserving the incredible and diverse environment we share with our non-human neighbors.

Of course, you never know where a partnership can lead, what new opportunities it can unlock and how diverse the benefits can be.

One example from the natural world immediately springs to mind: the collaboration between wolves and ravens. According to the research of John Vucetich, Rolf Peterson, and Bernd Heinrich, this relationship seems to work for a variety of reasons. Ravens are great at locating prey. They've been observed to call raucously, alerting wolf packs to the location of potential prey, such as an injured elk. Wolves themselves are able to capture more prey when hunting in packs and hence they seemingly rely on the ravens as guides to their food source. But the relationship doesn't end there. Ravens also work as sentries while both species feed, alerting the pack to any potential threats. It is also believed that ravens lead wolves to animal carcasses, perhaps so that the wolves can penetrate carcasses too hard for the ravens' beaks, breaking down and processing the carrion for the ravens while feeding. All in all, both species benefit from this collaboration.

Thanks for being a part of our pack and flock—we deeply appreciate your support and I encourage you to think about the benefits that assisting our mission provides you.

Also, I encourage you to discover and explore more about collaborations in nature—there are some fascinating and unlikely partners out there!

Thurston Elfstrom

Thurston Elfstrom,
Executive Director



Become a Member of the Montana Natural History Center!

MNHC members get all kinds of great benefits: free admission to our Center; an annual subscription to *Montana Naturalist* magazine; discounts on MNHC classes, programs, and summer camps; and, through our participation in the Association for Science-Technology Centers' passport program, reciprocal admission to more than 300 science centers in North America.

Check out  astc.org for a

complete list of participating centers. We offer three membership levels: \$35 individual membership, \$60 family membership, and our \$75 grandparent membership, which is a great option for the whole family—it includes you, your children, grandchildren, and any other family/visitors.

Join us...renew your membership or become a member today!



Bruce Baty, MNHC's Rock Man BY ALLISON DE JONG



MNHC PHOTOS

Bruce Baty, retired Hellgate High School earth sciences teacher and lover of all things geological, has been volunteering at the Montana Natural History Center since the late Sherri Lierman encouraged him to get involved five years ago. She'd taken a couple of his adult education classes on geology and thought he might be interested in using his knowledge and skills at MNHC.

She was right.

Bruce grew up in Ohio and studied geology at Bowling Green State University, which mostly meant looking at trays of rocks in a lab. For graduate school, however, he wanted to be able to study rocks in their natural habitat, so he came to Montana—and the rest is history. When he retired

in 2000 after 31 years of teaching, he worked at a couple of bike shops and taught some adult ed classes, but always had a plan to do volunteer work. MNHC has been a great fit.

Bruce's first task was organizing and labeling MNHC's unwieldy collection of rocks and minerals. Bruce sorted some out by type—igneous, metamorphic, sedimentary—and placed them into several study sets, which are used in our Naturalist Lab, summer camps, and adult programming. Special and unique specimens have been set apart for other programs and potential exhibits, while the unexceptional—or, as Bruce calls them, “rock garden”—rocks were quietly removed to our landscaping and Nature Adventure Garden.

Since those early days of organizing and labeling our rock collection, Bruce has become MNHC's go-to geology expert, giving advice on exhibits, leading popular Naturalist Field Days and four-part classes, teaching an overview geology course for the staff, and, most recently, broadcasting a distance education presentation to senior centers on the geology of Glacier National Park.

“It's just fun to share what I know with other people so that they can see the world a little differently,” says Bruce. Many of those who take his classes are widely traveled, and they love finding answers to questions they have about the geologic history of the places they've visited. And all of the participants enjoy Bruce's engaging stories, vast knowledge, and just getting a geology refresher, whether their last earth science course was four years ago or forty.

Bruce particularly loves teaching the rock and mineral classes, crafting fun and informative lessons for MNHC's science-oriented participants. “I enjoy the challenge of putting new lessons together,” he says. “And there are always those ‘aha’ moments when you're teaching and people get it. Some people have said I've changed their life, because they start to see new things when they're outside, and that's really refreshing and encouraging.”

Bruce has definitely changed our lives at MNHC—we are so grateful for his enthusiasm, kindness, and expertise.

Thank you, Bruce!

Bruce's October Naturalist Field Day: Roadside Geology is sold out, but he'll be teaching more classes in 2020!





The Alpine Wanderer

STORY BY NICHOLAS LITTMAN

Wolverine tracks meandering around the cirque below El Capitan in the Bitterroot Mountains. Wolverine males have been known to roam ranges as large as 800 square miles in a year.

It is early afternoon when he makes it to the base of the cirque. Or maybe it is midnight, with a faint slice of moon, the smooth rise and swale of snow glowing pale and flat below the looming, dark cliffs above. The last few nights it hasn't frozen in the high country, the crust hasn't set up as firm as it usually does in early April. The soft snow doesn't bother him much, though: his paws are as wide as a wolf's, his body lithe as a lynx's. He floats on top of coarse facets, effortless, like a water strider on a pond. While our tracks are heavy and obvious—huge, teardrop-shaped imprints tromping towards the couloir of El Capitan Peak—his are light and wandering. His prints show he has been walking—meandering with purpose—around the basin. He does not leap, slinky-like, as other weasels do. He does not hibernate like the bears he is said to resemble. He walks and lopes through deep snow all through the fierce, short days of winter. He traverses up and down the valleys and ridges of the Bitterroot Mountains through a home range that can stretch over a hundred miles. When we come across his imprints near the base of the couloir, it feels like we have encountered a ghost, a shadow of a wanderer's path. We follow the tracks to see the story they tell.

We imagine our mustelid wanderer as a male. Females are not traveling far at this time of year; they are in their dens, raising their young. Male wolverines, however, are constantly moving. This one may have traveled up this drainage all evening long, crisscrossing in search of abandoned carcasses. He may have smelled a frozen snowshoe hare buried many feet beneath the snow and dug it up to eat it whole, splintering the white bones in his jaws. Or perhaps his nose led him to an elk carcass abandoned by wolves days ago. Or maybe, he found no food in this valley. This wouldn't worry him much; he is used to eating infrequently. When he finds food, he eats voraciously. For this habit we've named him the glutton—*gulo*—hardly fitting for an animal that floats on snow and must walk far and wide to find enough food.

He keeps moving; he's always moving. If not for food, then to find a female, or to stay out of another male's range. Spring is in the valley below, fawns and calves have been born, everything is beginning to grow. Here, at 8,000 feet in the mountains, ten feet of snow keeps most living creatures buried and silent. Perhaps that's why he wanders among the high peaks—it is always silent. There is nothing to challenge him here, nothing to disturb him.

PHOTO: NICK LITTMAN

We can only speculate. All we see are tracks that wind circuitously from a frozen lake to our south. They come to the base of a massive, half-submerged boulder. They climb the snow ramp up the boulder and stop on the sharp edge. They pause, then walk to the highest point on the boulder—fifteen feet above the snow below.

The tracks are still. I imagine him gazing out on the star-bathed world, looking at where he has wandered from, and where he can go. He can go up and over and deeper into the mountains, or back down towards the valley that is melting and waking. In an instinctual second he decides. He is decisive. He is raw power. He leaps.

He springs straight off the top of the boulder. He lands far out in the snow, feet together, sinews compressed, a twenty-five-pound snarl of muscle. And he goes on walking. He passes by another boulder, big as a sinking ship's upturned bow, then turns uphill and pads in a straight line, straighter than the steps we can make with crampons on our feet, up the couloir. Even on the

steepest slope—forty degrees—steep enough to reach out and use our hands for balance, he goes straight, never stopping. I imagine he takes fifteen minutes to reach the top of the 1500-foot couloir (wolverines have been known to walk 5,000 vertical feet to the top of a mountain in only ninety minutes). It takes us an hour.

He does not stop at the top. He curves off the mountain, into the gully in front of him, descending to the forest and the basin below. He goes further into the mountains. Perhaps he goes to visit his newborn young (he will visit until they are weaned). Or he goes to dig up a cache of field mice and rabbits he buried in the fall. Or he goes to escape the rising din of the valley. As the world melts, loud humans move into valleys and forests below. Up high, no one challenges him. He moves unencumbered. Mountains are his refuge; they are his survival.

Whatever the reason for scaling the couloir, he does it with conviction. At the top of the couloir, I take a few steps

down his path and want to follow his tracks, to disappear into the wilderness in front of me. When I find myself on a wild edge, I often think of disappearing, of becoming the unseen rather than the obvious, the quiet alpine wanderer rather than the babbling, tromping biped. I know how quickly I would expire, how little I have learned about the focused attention necessary for survival. I know what tenacity and endurance is required to live as the wolverine does.

The wolverine is transparent. We see only his shadow.

He climbs, he descends, he tracks forward. 🐾

—Nicholas Littman teaches poetry to 4th graders for the Missoula Writing Collaborative and experiential, place-based field courses to college and high school students. He has published essays or poetry in *The Montana Quarterly*, *The Hopper*, *Blueline*, *Camas*, *Montana Naturalist* and elsewhere. More of his writing and photography can be found at lotusfromthemud.blogspot.com.



We mark the places of leap and landing. From his landing spot, the wolverine proceeded to walk straight up and over the forty-degree, 1,500-foot couloir above us.

PHOTO: BRIAN CHRISTIANSON



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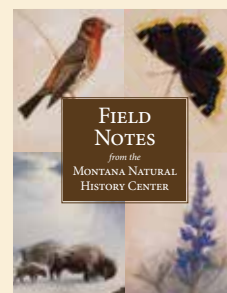
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On the opening day of Montana's 2018 hunting season, I bagged 35 meteors between moonset (4:00 a.m.) and dawn (6:30 a.m.). All catch and release, of course, as documented in this composite image. Most meteors traced back towards Orion the Hunter, marking them as likely Orionid meteors—dust from Halley's Comet. Mountains in the middle are (left to right) Heavens Peak, McPartland Mountain and Mount Vaught, all in Glacier National Park.

~John Ashley

See more of John's celestial photography at johnashleyfineart.com.

Orionid meteors fly between early October and early November, when Earth passes through the debris left by Halley's Comet. The shower peaks this year on October 21 or 22; the greatest concentration of meteors occurs in the early hours before dawn. While Orionid meteors tend to be relatively faint, many of them leave persistent gas trails that linger in the sky for a few seconds. Visit earthsky.org for more info!



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